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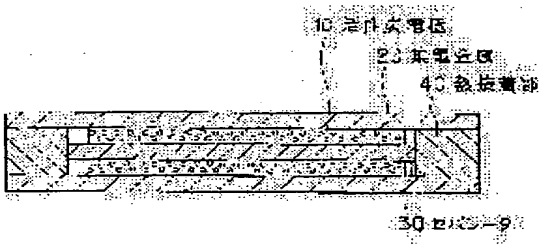
(54) ELECTRIC DOUBLE-LAYER CAPACITOR

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an electric double-layer capacitor that can be configured thinly and at the same time can be miniaturized.
SOLUTION: Power collection metals 20 where an activated carbon electrode 10 is bonded are allowed to oppose one another, and at the same time a separator 30 and electrolyte are interposed among them. Further, a thermal bonding section 40 such as denatured polypropylene or denatured polyethylene is bonded in advance to the outermost periphery section of the power collection metals 20, the thermal bonding section 40 is heated and the power collection metals 20 are bonded each other for sealing.



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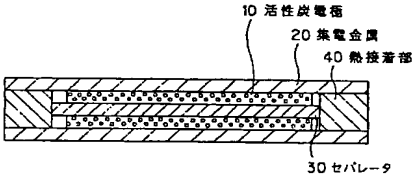
(54)【発明の名称】電気二重層キャパシタ

(57)【要約】

【課題】　薄く構成すると共に小型化することができる電気二重層キャパシタを提供するにある。

【解決手段】　活性炭電極１０を接着した集電金属２０を対向させると共にこれらの間にセパレータ３０及び電解液を介在させ、更に、前記集電金属２０の最外周部に変成ポリプロピレン又は変成ポリエチレン等の熱接着部４０を予め接着し、該熱接着部４０を加熱して前記集電金属３０を相互に接着し密封することを特徴とする。



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【特許請求の範囲】

【請求項１】　活性炭電極を接着した集電金属を対向させると共にこれらの間にセパレータ及び電解液を介在させ、更に、前記集電金属の最外周部に変成ポリプロピレン又は変成ポリエチレン等の熱接着部を予め接着し、該熱接着部を加熱して前記集電金属を相互に接着し密封することを特徴とする電気二重層キャパシタ。

【請求項２】　前記集電金属の背面同士を相互に接触させて、前記電気二重層キャパシタを直列に接続し、高電圧化及び高容量化を図ることを特徴とする請求項１記載の電気二重層キャパシタ。

【請求項３】　前記熱接着部は、電気二重層キャパシタにおける絶縁材料として機能することを特徴とする請求項１記載の電気二重層キャパシタ。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、電気二重層キャパシタに関する。詳しくは、電気二重層キャパシタにおけるパッケージング方法と集電金属の取り出し方法に関する。

【０００２】

【従来の技術】現在用いられているコンピュータには、メモリのバックアップ用として、電気二重層キャパシタが利用されている。この電気二重層キャパシタは、Ａｌ電解コンデンサに代表される電極間に誘電体を有するコンデンサに比べ、体積あたりの容量が３００～１０００倍高く、小型で大容量であり、また、繰返し寿命が長いという特徴を有する。この電気二重層キャパシタは、この２つの電極の間に電解質が存在する構造を有している。

【０００３】即ち、電気二重層キャパシタは、分極性電極に電解質中のアニオン、カチオンをそれぞれ正極・負極表面に物理吸着させて電気を蓄えるという原理で動作するため、その吸着する電極の表面積が大きいことが要求される。そこで、現在では、比表面積が１０００～３０００（m^2／ｇ）の活性炭がこの電気二重層キャパシタの電極として利用されている。

【０００４】近年、この電気二重層キャパシタを、様々な機器のバックアップ電源として広く用いられるようになってきた。適用対象の大容量化に伴い、バックアップとして用いる電気二重層キャパシタも、大容量化が望まれている。このとき、大容量化の電気二重層キャパシタにおいては、使用電圧の高いことや内部抵抗が低く大電流が流せることが望ましい。

【０００５】電気二重層キャパシタの構成を図９に示す。同図に示すように、対向する集電極４にはそれぞれ活性炭電極１が張り付けられると共にこれらの活性炭電極１の間には両極の短絡を防ぐためにセパレータ２が挿入され、また、これらの間には電解液３が充填されている。電気二重層キャパシタからの電気の取り出しは、図

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７に示すように、両極である各集電極４の背面より直接取り出す構成になっている。また、集電極４のサイド部より直接取り出す構成のものもある。尚、実際の電気二重層キャパシタは、電解液３の漏れを防止するために、シール構造が設けられている。

【０００６】

【発明が解決しようとする課題】近年、この電気二重層キャパシタを、様々な機器のバックアップ電源として広く用いられるようになってきた。適用対象の大容量化に伴い、バックアップとして用いる電気二重層キャパシタも、大容量化が望まれている。それと同時に、キャパシタの重量当りのエネルギー密度と体積当りのエネルギー密度を大きくし、機器への取り付けの際に、小型化を図る試みがなされている。

【０００７】例えば、電極の構成材料に改良を行い、単位体積当りのイオン吸着量を増加させ、キャパシタ自体の静電容量を上げることによってエネルギー密度を上げる試み等がなされている。また、キャパシタの包装形態として、従来から金属缶に挿入して、電気取り出し端子のみを外に出す方式や、リチウム電池に見られるアルミ箔と樹脂フィルムによって構成される、アルミラミネートフィルムによるパッケージングなども検討されてきている。平板のキャパシタ・単セルを多積層して構成した積層型キャパシタの概略を図１０に示す。

【０００８】この積層型キャパシタは、キャパシタ本体５を積層すると共にこれらと枠状のパッキン７で囲み、更に、両側から押え板６で挟み込み、ボルト８及びナット９で締め付けた構造であり、積層数に比例してキャパシタユニットの耐電圧を上げることが可能となる。しかし、ユニットの内部抵抗も比例して大きくなるので、内部抵抗（分極性電極－集電極、セル間）を減らすため、言い換えると、内部抵抗の要因となる接触部の面積を広げるため、厚みのある押え板６で積層体の両端を挟持し、ボルト８及びナット９で締め付ける構成を取っていた。また、積層体の上記キャパシタ以外の外装保持構成部材は、キャパシタセルに比べて重量があり、エネルギー密度の増加の妨げとなっている。外気とのシール性を向上させるために、アルミラミネートフィルムを用いた場合でも同様である。

【０００９】

【課題を解決するための手段】上記課題を解決する本発明の請求項１に係る電気二重層キャパシタは、活性炭電極を接着した集電金属を対向させると共にこれらの間にセパレータ及び電解液を介在させ、更に、前記集電金属の最外周部に変成ポリプロピレン又は変成ポリエチレン等の熱接着部を予め接着し、該熱接着部を加熱して前記集電金属を相互に接着し密封することを特徴とする。上記課題を解決する本発明の請求項２に係る電気二重層キャパシタは、請求項１において、前記集電金属の背面同士を相互に接触させて、前記電気二重層キャパシタを直

列に接続し、高電圧化及び高容量化を図ることを特徴とする。上記課題を解決する本発明の請求項３に係る電気二重層キャパシタは、請求項１記載において、前記熱接着部は、電気二重層キャパシタにおける絶縁材料として機能することを特徴とする。

【００１０】

【発明の実施の形態】〔実施例１〕本発明の第１の実施例に係る平板型電気二重層キャパシタの模式図を図１に示す。本実施例は、本発明の実施例のうちで最も基本的な構成を示すものである。即ち、この平板型電気二重層キャパシタは、活性炭電極１０を接着した集電金属２０を対向させると共にこれらの間にセパレータ３０及び電解液を介在させ、更に、前記集電金属２０の最外周部に変成ポリプロピレン又は変成ポリエチレン等の熱接着部４０を予め接着して、該熱接着部４０により前記集電金属２０を相互に熱接着して密封したものである。ここで、集電金属２０としてはアルミ箔が用いられ、活性炭電極１０が電気的に接続している。

【００１１】接続方法としては、導電性接着剤、導電性塗料、導電性樹脂による溶着加熱接続、電極表面をアルミ溶射しアルミ箔と接触させる方法、電極自体をアルミ箔に塗布する方法等、あらゆる方法でよい。セパレータ３０としては、セルロース、合成樹脂などを用いた不織布乃至合成樹脂に物理的、化学的に細孔を設けたものなどが挙げられる。このような電気二重層キャパシタの最外周部においては、集電金属２０が熱接着部４０を介して熱接着されている。熱接着部４０としては、アルミニウムとも接着しやすいように、酸などで変成させたポリプロピレン（変成ポリプロピレン）或いはポリエチレン（変成ポリエチレン）等が用いられる。

【００１２】電気二重層キャパシタの最外周部とは、セパレータ３０や電解液が間に介在せず、集電金属２０が相互に向かい合う領域をいう。上記構成を有する本実施例においては、変成したポリプロピレン乃至ポリエチレンである熱接着部４０により、アルミ箔である集電金属２０を相互に接着すると共にこれら集電金属２０の絶縁を行い、更に、電解液が漏れないように密封（シール）するため、電気二重層キャパシタを極めて薄く構成すると共に小型化することができた。

【００１３】即ち、活性炭電極１０、集電金属２０、セパレータ３０及び熱接着部４０による単純な構成のために、従来使用していた端板（押え板）等のセル構成材料を不要とすることができた。そのため、部品点数が減少し、コストが低減でき、しかも、不良発生率がほとんどなくなるという効果を奏する。また、このように電気二重層キャパシタの構成要素を単純化することによって、小型・軽量のキャパシタを構成できるようになった。特に、集電金属２０としてのアルミ箔を外装体としても使用するため、エネルギー密度を大きくとることができた。

【００１４】〔実施例２〕本発明の第２の実施例に係る平板型電気二重層キャパシタの模式図を図２に示す。電気二重層キャパシタは、一般的な電池より内部抵抗が低いため、大きな電流を取り出すことができるよう、本実施例では、電気の取り出しを基本的に背面から取り出すようにしたものである。

【００１５】即ち、活性炭電極１０を接着した集電金属２０の背面に、それぞれ電気取り出し部５０を装着したものである。尚、その他の構成は図１に示す実施例１と同様である。本実施例では、前述した実施例１と同様に電気二重層キャパシタを薄く構成したため、実施例１と同様な効果を奏する他、背面から電気を取り出すことによって、端子部の抵抗損失を押さえることができ、信頼性を高めることができた。

【００１６】〔実施例３〕本発明の第１の実施例に係る平板型電気二重層キャパシタの製造方法について、図３を参照して説明する。先ず、図３（ａ）に示すように、活性炭電極１０が対向するように、集電金属２０と活性炭電極１０の接合体を向かい合わせ、その間にセパレータ３０を挿入する。次に、図３（ｂ）に示すように、集電金属２０、活性炭電極１０及びセパレータ３０の間には電解液を含ませ、更に、最外周部にある熱接着部４０を熱接着させることで、キャパシタのシール構成を完了させる。

【００１７】ここで、熱接着部４０は、図３（ａ）に示すように、集電金属２０の最外周部に予め熱接着フィルム４１として接着させておくことが望ましい。集電金属２０の最外周部に接着されたは熱接着フィルム４１は、ヒータ６０による加熱により、熱接着部４０として集電金属２０を相互に接着する。本実施例においては、前述した実施例１と同様に、変成したポリプロピレン乃至ポリエチレンである熱接着部４０により、アルミ箔である集電金属２０を相互に接着すると共にこれら集電金属２０の絶縁を行い、更に、電解液が漏れないように密封（シール）するため、その他のセル構成材料を削減でき、電気二重層キャパシタを薄く構成すると共に小型化することができた。

【００１８】〔実施例４〕本発明の第４の実施例に係る平板型電気二重層キャパシタを図４に示す。本実施例は、実施例３に比較し、電気二重層キャパシタの最外周部の絶縁構成を更に確実にしたものである。

【００１９】即ち、図４に示すように、変成させたポリプロピレン又はポリエチレンの熱接着フィルム４１を集電金属２０の内側の最外周部に予め熱接着するだけでなく、変成させたポリプロピレン又はポリエチレンの熱接着フィルム４２をその外側の最外周部にも熱接着するものである。尚、その他の構成は図３に示す実施例３と同様である。本実施例においては、前述した実施例３と同様に、熱接着フィルム４１が熱接着部４０として集電金属２０を相互に接着することができるだけでなく、熱接

着フィルム４２により電気二重層キャパシタの最外周部の絶縁を更に確実できるという効果をも奏する。

【００２０】〔実施例５〕本発明の第５の実施例に係る平板型電気二重層キャパシタを図５に示す。本実施例は、背面から電気を取り出す必要がない場合である。即ち、図５に示すように、集電金属２０の背面を全面にわたり、変成させたポリプロピレン又はポリエチレンの熱接着フィルム４３を貼ることによって絶縁を構成したものである。尚、その他の構成は図３に示す実施例３と同様である。本実施例においては、前述した実施例３と同様な効果を奏する他、熱接着フィルム４３により電気二重層キャパシタの最外周部の絶縁を更に確実できるだけでなく、集電金属２０の背面全面にわたり絶縁を確実にできるという効果をも奏する。

【００２１】〔実施例６〕本発明の第６の実施例に係る平板型電気二重層キャパシタの模式図を図６に示す。本実施例は、前述した実施例１に係る電気二重層キャパシタを複数組み合わせることによって、高電圧化及び大容量化を図るものである。

【００２２】即ち、実施例１で示した単一の電気二重層キャパシタは背面から電気を取り出すことができるため、本実施例では図６に示すように、実施例１で示した単一の電気二重層キャパシタを単セルキャパシタとして複数個積み重ねたものである。その他の構成は図１に示す実施例１と同様である。本実施例では、前述した実施例１と同様に電気二重層キャパシタを薄く構成したため、実施例１と同様な効果を奏する他、単セルキャパシタを複数個積み重ねるだけで、大型化を防ぎながら、高電圧化及び大容量化を達成できた。

【００２３】〔実施例７〕本発明の第７の実施例に係る平板型電気二重層キャパシタの模式図を図７に示す。本実施例は、実施例６の改良に係るものである。実施例６では、個々の単セルキャパシタごとにアルミ箔である集電金属２０が必要であったが、本実施例では、隣接する単セルキャパシタ間で集電金属２０を共有するようにしたものである。

【００２４】即ち、アルミ箔である集電金属２０の両面に活性炭電極１０を設け、併せて変成させたポリプロピレン又はポリエチレンよりなる熱接着層４０を設けることによって小型で高電圧の電気二重層キャパシタを作成したものである。本実施例では、前述した実施例１と同様に電気二重層キャパシタを薄く構成したため、実施例１と同様な効果を奏する他、単セルキャパシタを複数個積み重ね、更に、集電金属２０の共用化により、実施例６に比較し更に大型化を防ぎながら、高電圧化及び大容量化を達成できた。

【００２５】〔実施例８〕本発明の第８の実施例に係る平板型電気二重層キャパシタの模式図を図８に示す。本実施例は、並列接続の実施例である。即ち、上述した実施例に係る電気二重層キャパシタ６０を平面的に配置すると共にそれらの両面に並列接続箔７０を接触させたものである。

【００２６】このように本実施例では、電子機器などで電圧を必要としない場合は、電気二重層キャパシタ６０を単純に平面に敷き詰め、並列接続箔７０を介して上下より一括して電気を集めることができる。また、キャパシタの面積を大きくする場合、単純に薄型キャパシタをならべることで構成が完了できるという利点もある。

【００２７】

【発明の効果】以上、実施例に基づいて具体的に説明したように、本発明によれば、変成したポリプロピレン乃至ポリエチレンである熱接着部により、集電金属を相互に接着すると共にこれら集電金属の絶縁を行い、更に、電解液が漏れないように密封するため、電気二重層キャパシタを極めて薄く構成すると共に小型化することができた。

【図面の簡単な説明】

【図１】本発明の第１の実施例に係る平板型電気二重層キャパシタの模式図である。

【図２】本発明の第２の実施例に係る平板型電気二重層キャパシタの模式図である。

【図３】本発明の第３の実施例に係る平板型電気二重層キャパシタの製造方法の説明図である。

【図４】本発明の第４の実施例に係る平板型電気二重層キャパシタの断面図である。

【図５】本発明の第５の実施例に係る平板型電気二重層キャパシタの断面図である。

【図６】本発明の第６の実施例に係る平板型電気二重層キャパシタの模式図である。

【図７】本発明の第７の実施例に係る平板型電気二重層キャパシタの模式図である。

【図８】本発明の第８の実施例に係る平板型電気二重層キャパシタの模式図である。

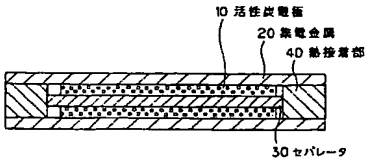
【図９】電気二重層キャパシタの作動原理図である。

【図１０】従来の電気二重層キャパシタの断面図である。

【符号の説明】

１０　活性炭電極
２０　集電金属
３０　セパレータ
４０　熱接着部
４１，４２，４３　熱接着フィルム
５０　電気取り出し部
６０　ヒータ
７０　並列接続箔

【図１】



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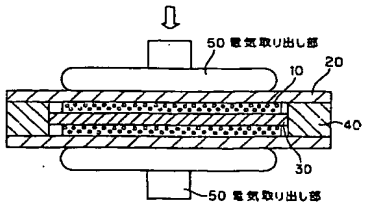

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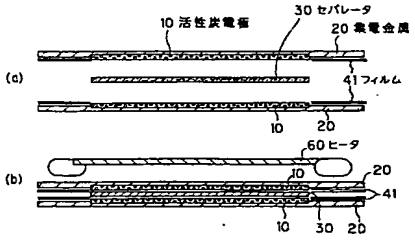

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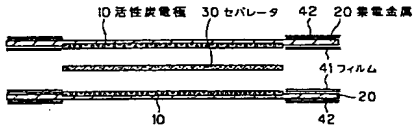

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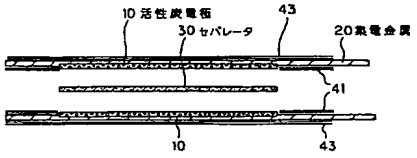

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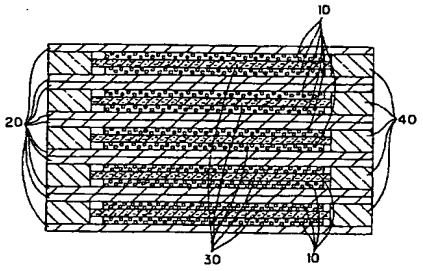

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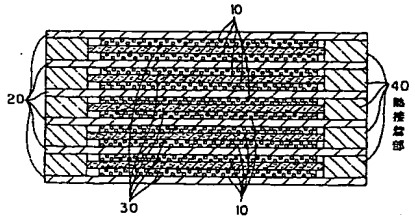

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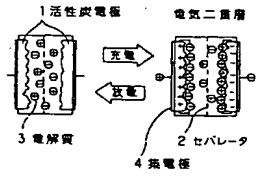

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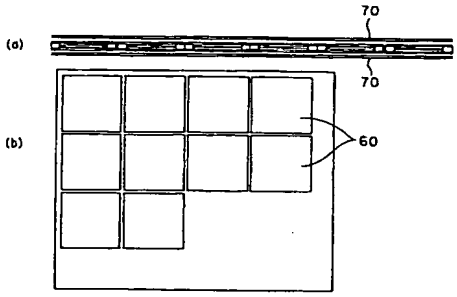
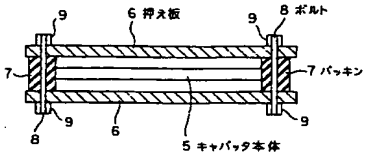


【図１０】



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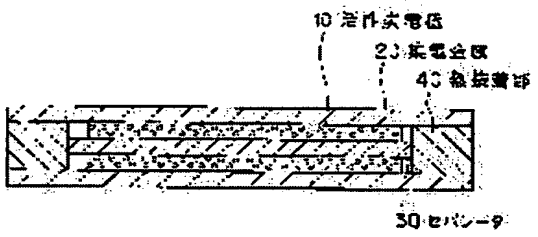
TAMURA TATSUTOSHI

(54) ELECTRIC DOUBLE-LAYER CAPACITOR

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an electric double-layer capacitor that can be configured thinly and at the same time can be miniaturized.
SOLUTION: Power collection metals 20 where an activated carbon electrode 10 is bonded are allowed to oppose one another, and at the same time a separator 30 and electrolyte are interposed among them. Further, a thermal bonding section 40 such as denatured polypropylene or denatured polyethylene is bonded in advance to the outermost periphery section of the power collection metals 20, the thermal bonding section 40 is heated and the power collection metals 20 are bonded each other for sealing.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The electric double layer capacitor characterized by making a separator and the electrolytic solution intervene among these while making the current collection metal on which the activated carbon electrode was pasted up counter, pasting up beforehand heat jointing, such as conversion polypropylene or conversion polyethylene, on the outermost periphery of said current collection metal further, heating this heat jointing, pasting up mutually and sealing said current collection metal.
[Claim 2] The electric double layer capacitor according to claim 1 characterized by contacting the tooth backs of said current collection metal mutually, connecting said electric double layer capacitor to a serial, and attaining high-tension-izing and high capacity-ization.
[Claim 3] Said heat jointing is an electric double layer capacitor according to claim 1 characterized by functioning as an insulating material in an electric double layer capacitor.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to an electric double layer capacitor. In detail, it is related with the packaging approach and the ejection approach of a current collection metal in an electric double layer capacitor.
[0002]
[Description of the Prior Art] The electric double layer capacitor is used for the computer used now as an object for backup of memory. This electric double layer capacitor has a 300 to 1000 times higher capacity per volume compared with the capacitor which has a dielectric in inter-electrode [which is represented by aluminum electrolytic capacitor], and it is small, and is large capacity, and has the description that a repetition life is long. This electric double layer capacitor has the structure where an electrolyte exists between these two electrodes.
[0003] That is, in order that an electric double layer capacitor may operate by the principle of making a positive electrode and a negative-electrode front face carrying out physical adsorption of the anion in an electrolyte, and the cation to a polarizable electrode, respectively, and storing the electrical and electric equipment in it, it is required that the surface area of the electrode to which it sticks should be large. So, the activated carbon of 1000-3000 (m2/g) is used for specific surface area as an electrode of this electric double layer capacitor now.
[0004] In recent years, it has come to use this electric double layer capacitor widely as a backup power supply of various devices. Large capacity-ization is desired also for the electric double layer capacitor used as backup with large-capacity-izing for application. At this time, it is desirable in the electric double layer capacitor of large-capacity-izing that things and internal resistance with high service voltage are low, and a high current can be passed.
[0005] The configuration of an electric double layer capacitor is shown in drawing 9 . As shown in this drawing, while the activated carbon electrode 1 is stuck on the collector 4 which counters, respectively, in order to prevent the short circuit of two poles among these activated carbon electrodes 1, a separator 2 is inserted, and it fills up with the electrolytic solution 3 among these. The ejection of the electrical and electric equipment from an electric double layer capacitor has composition taken out direct picking from the tooth back of each collector 4 which is two poles, as shown in drawing 7. Moreover, there is also a thing of a configuration of taking out direct picking from the side section of a collector 4. In addition, seal structure is established in order that a actual electric double layer capacitor may prevent the leakage of the electrolytic solution 3.
[0006]
[Problem(s) to be Solved by the Invention] In recent years, it has come to use this electric double layer capacitor widely as a backup power supply of various devices. Large capacity-ization is desired also for the electric double layer capacitor used as backup with large-capacity-izing for application. it simultaneously the energy density per weight of a capacitor, and the energy density per volume are enlarged, and the attempt which attains a miniaturization in the case of the installation to a device is made.
[0007] For example, improve to the component of an electrode, the ion amount of adsorption per unit volume is made to increase, and the attempt which raises an energy density is made by raising the electrostatic capacity of the capacitor itself. Moreover, as a package gestalt of a capacitor, it inserts in a metal can from the former, and the packaging by the aluminum laminate film constituted with the method which takes out only an electric ejection terminal outside, the aluminum foil looked at by the lithium cell, and a resin film has been examined. The outline of the laminating mold capacitor which carried out the many laminatings of the capacitor and the single cel of a plate, and constituted it is shown in drawing 10 .
[0008] This laminating mold capacitor is the structure which surrounded by the packing 7 of the shape of these and a frame while carrying out the laminating of the body 5 of a capacitor, put with the pressure plate 6 from both sides further, and was bound tight with the bolt 8 and the nut 9, and becomes possible [raising the withstand voltage of a capacitor unit in proportion to the number of laminatings]. However, in order to extend the area of the contact section leading to internal resistance if it puts in another way in order to reduce internal resistance (between a polarizable electrode-collector and a cel) since the internal resistance of a unit also becomes large proportionally, the configuration which pinches the ends of a layered product with the thick pressure plate 6, and is bound tight with a bolt 8 and a nut 9 was taken. Moreover, sheathing maintenance configuration members other than the above-mentioned capacitor of a layered product have weight compared with a capacitor cel, and serve as hindrance of the increment in an energy density. In order to raise seal nature with the open air, it is the same even when an aluminum laminate film is used.
[0009]
[Means for Solving the Problem] The electric double layer capacitor concerning claim 1 of this invention which solves the above-mentioned technical problem is characterized by making a separator and the electrolytic solution intervene among these, while making the current collection metal on which the activated carbon electrode was pasted up counter, pasting up beforehand heat jointing, such as conversion polypropylene or conversion polyethylene, on the outermost periphery of said current collection metal further, heating this heat jointing, pasting up mutually and sealing said current collection metal. In claim 1, the electric double layer capacitor concerning claim 2 of this invention which solves the above-mentioned technical problem contacts the tooth backs of said current collection metal mutually, connects said electric double layer capacitor to a serial, and is characterized by attaining high-tension-izing and high capacity-ization. The electric double layer capacitor concerning claim 3 of this invention which solves the above-mentioned technical problem is characterized by said heat jointing functioning as an insulating material in an electric double layer capacitor in claim 1 publication.
[0010]
[Embodiment of the Invention] [Example 1] The mimetic diagram of the plate mold electric double layer capacitor concerning the 1st example of this invention is shown in drawing 1 . This example shows the most fundamental configuration among the examples of this

invention. That is, this plate mold electric double layer capacitor makes a separator 30 and the electrolytic solution intervene among these while making the current collection metal 20 on which the activated carbon electrode 10 was pasted up counter, the heat jointing 40, such as conversion polypropylene or conversion polyethylene, is beforehand pasted up on the outermost periphery of said current collection metal 20, and further, carries out heat adhesion of said current collection metal 20 mutually by this heat jointing 40, and seals. Here, aluminum foil was used as a current collection metal 20, and the activated carbon electrode 10 has connected electrically.
[0011] As a connection method, it is good by all approaches, such as joining heating connection by electroconductive glue, the conductive paint, and conductive resin, a method of carrying out aluminum thermal spraying of the electrode surface, and making aluminum foil contact, and the approach of applying the electrode itself to aluminum foil. What prepared pore physically and chemically is mentioned to a nonwoven fabric thru/or synthetic resin using a cellulose, synthetic resin, etc. as a separator 30. In the outermost periphery of such an electric double layer capacitor, heat adhesion of the current collection metal 20 is carried out through the heat jointing 40. As heat jointing 40, polypropylene (conversion polypropylene) or polyethylene (conversion polyethylene) etc. which carried out conversion from the acid etc. is used so that it may be easy to paste up aluminum.
[0012] Neither a separator 30 nor the electrolytic solution intervenes in between, but the outermost periphery of an electric double layer capacitor means the field where the current collection metal 20 faces mutually. In this example which has the above-mentioned configuration, by the heat jointing 40 which is the polypropylene thru/or polyethylene which carried out conversion, while pasting up mutually the current collection metal 20 which is aluminum foil, these current collection metal 20 was insulated, and further, since it sealed so that the electrolytic solution may not leak (seal), while constituting the electric double layer capacitor very thinly, it was able to miniaturize.
[0013] That is, cel components, such as an end plate (pressure plate) which was being conventionally used for the simple configuration by the activated carbon electrode 10, the current collection metal 20, the separator 30, and the heat jointing 40, were able to be made unnecessary. Therefore, components mark decrease, cost can be reduced and, moreover, the effectiveness that a defect incidence rate is almost lost is done so. Moreover, a small and lightweight capacitor can be constituted now by simplifying the component of an electric double layer capacitor in this way. Since the aluminum foil as a current collection metal 20 was especially used also as a sheathing object, the large energy density was able to be taken.
[0014] [Example 2] The mimetic diagram of the plate mold electric double layer capacitor concerning the 2nd example of this invention is shown in drawing 2 . Since an electric double layer capacitor has internal resistance lower than a common cell, as it can take out a big current, by this example, it takes out electric ejection from a tooth back fundamentally.
[0015] That is, the tooth back of the current collection metal 20 on which the activated carbon electrode 10 was pasted up is equipped with the electric takeoff connection 50, respectively. In addition, other configurations are the same as that of the example 1 shown in drawing 1 . Since the electric double layer capacitor was thinly constituted from this example like the example 1 mentioned above, the same effectiveness as an example 1 was done so, and also by taking out the electrical and electric equipment from a tooth back, the ohm loss of a terminal area could be pressed down and dependability was able to be raised.
[0016] [Example 3] The manufacture approach of the plate mold electric double layer capacitor concerning the 1st example of this invention is explained with reference to drawing 3 . First, as shown in drawing 3 (a), a separator 30 is inserted for the zygote of the current collection metal 20 and the activated carbon electrode 10 facing each other and between them so that the activated carbon electrode 10 may counter. Next, the electrolytic solution is included between the current collection metal 20, the activated carbon electrode 10, and a separator 30, and the seal configuration of a capacitor is made to complete by carrying out heat adhesion of the heat jointing 40 in the outermost periphery further, as shown in drawing 3 (b).
[0017] Here, as shown in drawing 3 (a), as for the heat jointing 40, it is desirable to make the outermost periphery of the current collection metal 20 paste as a heat adhesive film 41 beforehand. The **** adhesive film 41 pasted up on the outermost periphery of the current collection metal 20 pastes up the current collection metal 20 mutually as heat jointing 40 with heating at a heater 60. By the heat jointing 40 which is the polypropylene thru/or polyethylene which carried out conversion like the example 1 mentioned above in this example, while pasting up mutually the current collection metal 20 which is aluminum foil, these current collection metal 20 was insulated, and in order to seal so that the electrolytic solution may not leak (seal), while being able to reduce other cel components and constituting the electric double layer capacitor thinly further, it was able to miniaturize.
[0018] [Example 4] The plate mold electric double layer capacitor concerning the 4th example of this invention is shown in drawing 4 . This example makes still more reliable the insulating configuration of the outermost periphery of an electric double layer capacitor as compared with an example 3.
[0019] That is, as shown in drawing 4 , heat adhesion of the polypropylene which it not only carries out heat adhesion beforehand, but carried out conversion of the polypropylene which carried out conversion, or the heat adhesive film 41 of polyethylene to the outermost periphery inside the current collection metal 20, or the heat adhesive film 42 of polyethylene is carried out also at the outermost periphery of the outside. In addition, other configurations are the same as that of the example 3 shown in drawing 3 . In this example, the heat adhesive film 41 not only can paste up the current collection metal 20 mutually as heat jointing 40, but does so the effectiveness that it can carry out certain [of the insulation of the outermost periphery of an electric double layer capacitor] further with the heat adhesive film 42, like the example 3 mentioned above.
[0020] [Example 5] The plate mold electric double layer capacitor concerning the 5th example of this invention is shown in drawing 5 . This example is the case where the electrical and electric equipment does not need to be taken out from a tooth back. That is, as shown in drawing 5 , an insulation is constituted by sticking a rear spring supporter, the polypropylene which carried out conversion, or the heat adhesive film 43 of polyethylene on the whole surface for the tooth back of the current collection metal 20. In addition, other configurations are the same as that of the example 3 shown in drawing 3 . In this example, it does so the same effectiveness as the example 3 mentioned above, and also it not only can carry out the authenticity of the insulation of the outermost periphery of an electric double layer capacitor further with the heat adhesive film 43, but does so the effectiveness that a rear-spring-supporter insulation is ensured on all over the tooth back of the current collection metal 20.
[0021] [Example 6] The mimetic diagram of the plate mold electric double layer capacitor concerning the 6th example of this invention is shown in drawing 6 . This example attains high-tension-izing and large capacity-ization by combining two or more electric double layer capacitors concerning the example 1 mentioned above.
[0022] That is, by this example, since the single electric double layer capacitor shown in the example 1 can take out the electrical and electric equipment from a tooth back, as shown in drawing 6 , it accumulates two or more single electric double layer capacitors shown in the example 1 as a single cel capacitor. Other configurations are the same as that of the example 1 shown in drawing 1 . Since the electric double layer capacitor was thinly constituted from this example like the example 1 mentioned above, the same effectiveness as an example 1 was done so, and also high-tension-izing and large capacity-ization have been attained only by accumulating two or more single cel capacitors, preventing enlargement.
[0023] [Example 7] The mimetic diagram of the plate mold electric double layer capacitor concerning the 7th example of this

invention is shown in drawing 7 . This example starts amelioration of an example 6. In the example 6, for each single cel capacitor of every, although the current collection metal 20 which is aluminum foil was required, the current collection metal 20 is shared between this example between adjoining single cel capacitors.
[0024] That is, by forming the heat glue line 40 which consists of the polypropylene or polyethylene to which both sides of the current collection metal 20 which is aluminum foil were made to prepare, combine and carry out conversion of the activated carbon electrode 10, it is small and the electric double layer capacitor of high tension is created. Since the electric double layer capacitor was thinly constituted from this example like the example 1 mentioned above, the same effectiveness as an example 1 was done so, and also two or more single cel capacitors were accumulated, and high-tension-izing and large capacity-ization have been further attained by common use-ization of the current collection metal 20, preventing enlargement further as compared with an example 6.
[0025] [Example 8] The mimetic diagram of the plate mold electric double layer capacitor concerning the 8th example of this invention is shown in drawing 8 . This example is an example of parallel connection. That is, while arranging superficially the electric double layer capacitor 60 concerning the example mentioned above, the parallel connection foil 70 is contacted to those both sides.
[0026] Thus, in this example, when you do not need an electrical potential difference by electronic equipment etc., a flat surface can be simply covered with the electric double layer capacitor 60, and it can bundle up from the upper and lower sides through the parallel connection foil 70, and can collect electrical and electric equipment. Moreover, when enlarging area of a capacitor, there is also an advantage that a configuration can be completed by the ability of a thin capacitor to be simply stood in a line.
[0027]
[Effect of the Invention] As mentioned above, according to this invention, as concretely explained based on the example, by heat jointing which is the polypropylene thru/or polyethylene which carried out conversion, while pasting up the current collection metal mutually, these current collection metal was insulated, and since it sealed so that the electrolytic solution may not leak, while constituting the electric double layer capacitor very thinly, it was able to miniaturize further.

[Translation done.]

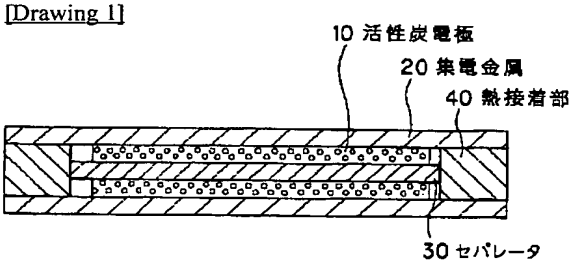
DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the mimetic diagram of the plate mold electric double layer capacitor concerning the 1st example of this invention.
[Drawing 2] It is the mimetic diagram of the plate mold electric double layer capacitor concerning the 2nd example of this invention.
[Drawing 3] It is the explanatory view of the manufacture approach of the plate mold electric double layer capacitor concerning the 3rd example of this invention.
[Drawing 4] It is the sectional view of the plate mold electric double layer capacitor concerning the 4th example of this invention.
[Drawing 5] It is the sectional view of the plate mold electric double layer capacitor concerning the 5th example of this invention.
[Drawing 6] It is the mimetic diagram of the plate mold electric double layer capacitor concerning the 6th example of this invention.
[Drawing 7] It is the mimetic diagram of the plate mold electric double layer capacitor concerning the 7th example of this invention.
[Drawing 8] It is the mimetic diagram of the plate mold electric double layer capacitor concerning the 8th example of this invention.
[Drawing 9] It is working-principle drawing of an electric double layer capacitor.
[Drawing 10] It is the sectional view of the conventional electric double layer capacitor.
[Description of Notations]
10 Activated Carbon Electrode
20 Current Collection Metal
30 Separator
40 Heat Jointing
41, 42, 43 Heat adhesive film
50 Electric Takeoff Connection
60 Heater
70 Parallel Connection Foil

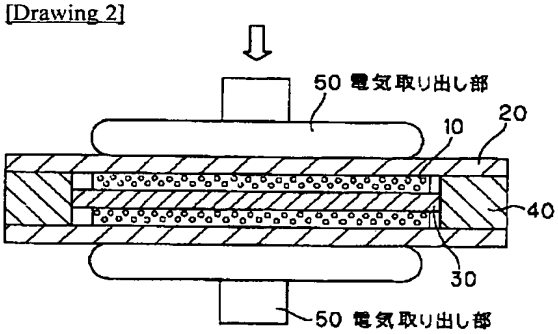
[Translation done.]

DRAWINGS

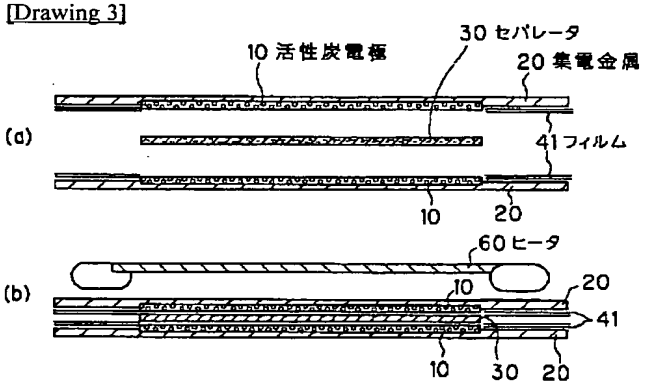
[Drawing 1]



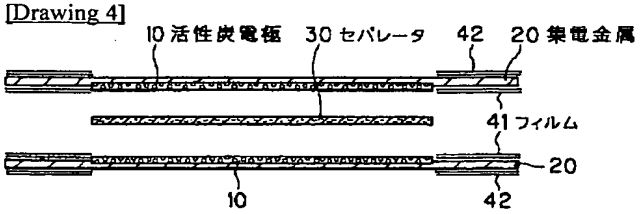
[Drawing 2]



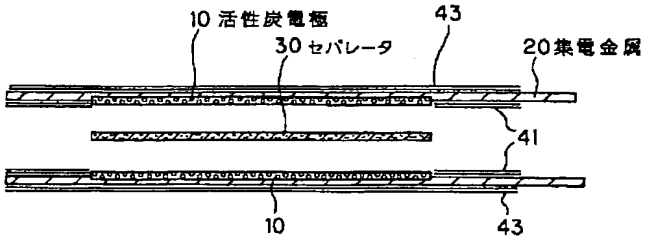
[Drawing 3]



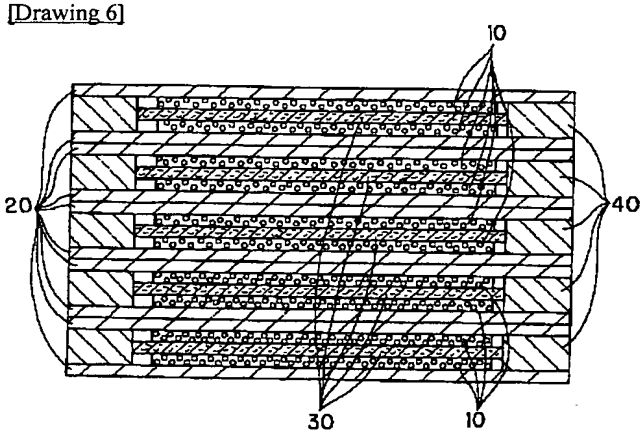
[Drawing 4]



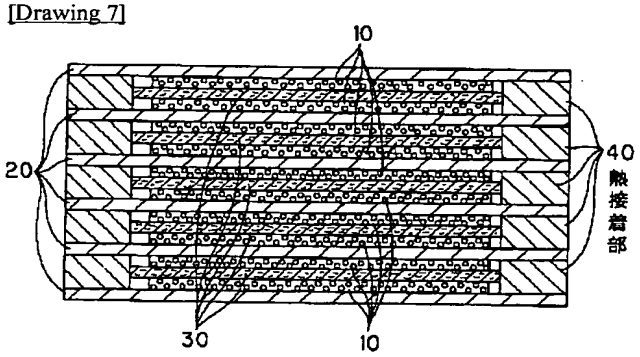
[Drawing 5]



[Drawing 6]



[Drawing 7]



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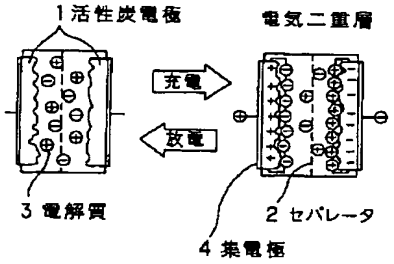
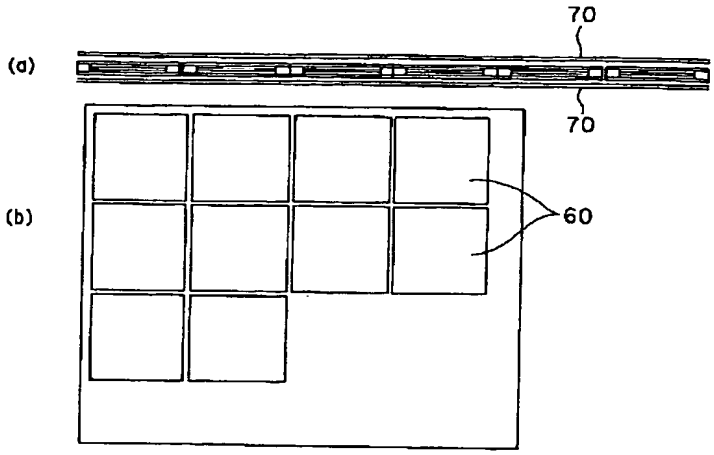
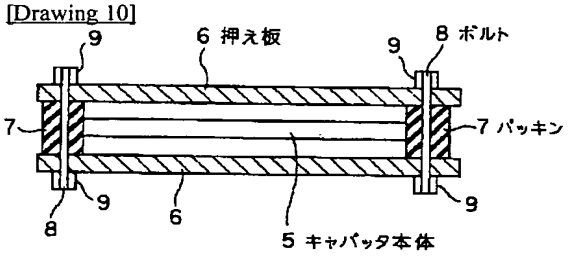


[Drawing 8]



[Drawing 10]



[Translation done.]